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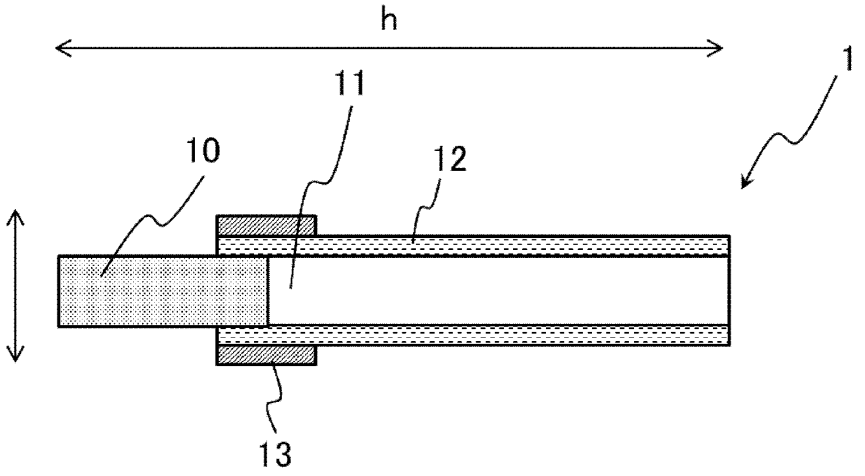
(54) **HEAT-NOT-BURN TOBACCO AND ELECTRICALLY HEATED TOBACCO PRODUCT**

(57) Provided is a non-combustion-heating-type tobacco having a wrapped portion which comprises a tobacco rod portion and a mouthpiece portion and in which these members are wrapped with a tipping paper, wherein at least a part of the tipping paper constituting the wrapped portion is coated with a resin composition, the region coated with the resin composition includes a heating area when the non-combustion-heating-type tobacco is used, and the resin composition includes a specific resin and a plasticizer.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a non-combustion-heating-type tobacco and an electrically heated tobacco product.

Background Art

[0002] An electrically heated tobacco product including an electric heating device and a non-combustion-heating-type tobacco product has been developed, the electric heating device including a heater member, a battery unit that serves as a power source for the heater member, and a control unit for controlling the heater member, and the non-combustion-heating-type tobacco product being configured to be inserted into the electric heating device so as to come into contact with the heater member (Patent document 1). The non-combustion-heating-type tobacco typically includes a tobacco rod including, for example, shredded tobacco or an aerosol-source material wrapped with wrapping paper; a mouthpiece through which an aerosol generated from the tobacco rod by heating is inhaled; and tipping paper wrapped around them.

[0003] The electrically heated tobacco product is used by inserting the non-combustion-heating-type tobacco into the electric heating device. The heater member is allowed to produce heat to heat the tobacco rod from the location at which the tobacco rod is in contact with the heater member, so that the aerosol-source material contained in the tobacco rod is delivered to the user together with a flavor component.

[0004] In the technical fields related to tobacco, in particular, in the field of non-combustion-heating-type tobacco products, an improvement in flavor is desired.

Citation List

Patent document

[0005] Patent document 1: Japanese Unexamined Patent Application Publication No. 2018-191652

Summary of Invention

Technical Problem

[0006] In the technical field related to non-combustion-heating-type tobacco, there is a demand for enhancing the value as a product by imparting, for example, a desired color, character, or pattern to a region including a portion to be heated at the time of use on the tipping paper included in the wrapped portion of the non-combustion-heating-type tobacco to impart a desired appearance to the non-combustion-heating-type tobacco or forming a base for imparting such a desired appearance.

[0007] It has been found that when a component contained in the coating agent is decomposed, the decomposed component causes an increase in the amount of substance generated, the substance having an undesirable influence on, for example, a smoke taste.

[0008] Accordingly, the present invention aims to provide a non-combustion-heating-type tobacco in which the generation of a substance having an undesired influence on, for example, a smoke taste is suppressed during the use of the non-combustion-heating-type tobacco and in which a desired appearance can be imparted to its wrapped portion, and an electrically heated tobacco product.

Solution to Problem

[0009] As a result of intensive studies, the present inventors have found that when a resin composition is applied to at least part of a wrapped portion wrapped with tipping paper, the region coated with the resin composition includes a portion heated during use of a non-combustion-heating-type tobacco, and when the resin composition has a specific composition, generation of a substance having an undesirable influence on, for example, the smoke taste can be suppressed during use of the non-combustion-heating-type tobacco, and a desired appearance can be imparted to the wrapped portion. These findings have led to the completion of the present invention.

[0010] The gist of the present invention is described below.

[1] A non-combustion-heating-type tobacco includes a tobacco rod portion, a mouthpiece portion, and a wrapped portion in which the tobacco rod portion and the mouthpiece portion are wrapped with tipping paper,

in which at least part of the tipping paper included in the wrapped portion is coated with a resin composition,
a region coated with the resin composition includes a heating area when the non-combustion-heating-type tobacco is used, and
the resin composition contains one or more resins selected from the group consisting of ethyl cellulose, hydroxyethyl cellulose, methyl cellulose, hydroxyethylmethyl cellulose, carboxymethyl cellulose, alkyd resins, polyamide resins, styrene-acrylic resins, butyl methacrylate-methyl methacrylate resins, and polyester resins, and a plasticizer.

[2] In the non-combustion-heating-type tobacco described in [1], the region coated with the resin composition includes at least a region having a length of 10% or less of the entire length of the tipping paper in the longitudinal direction of the non-combustion-heating-type tobacco and extending from an end portion of the tipping paper adjacent to the tobacco rod toward an end portion of an inhalation port.

[3] In the non-combustion-heating-type tobacco described in [1] or [2], the region coated with the resin composition includes at least a region extending from an end portion of the wrapped portion adjacent to the tobacco rod in the longitudinal direction to a position 5 mm or less from the end portion.

[4] In the non-combustion-heating-type tobacco described in any of [1] to [3], the resin composition further contains a coloring component.

[5] In the non-combustion-heating-type tobacco described in any of [1] to [4], the resin composition further contains a thermal developer.

[6] In the non-combustion-heating-type tobacco described in any of [1] to [5], the coating amount of solid content of the resin composition on the tipping paper is 0.0001% to 3% by weight.

[7] In the non-combustion-heating-type tobacco described in any of [1] to [6], the mouthpiece portion includes a cooling portion and a filter portion.

[8] An electrically heated tobacco product includes an electric heating device and the non-combustion-heating-type tobacco described in any of [1] to [7], the electric heating device including a heater member, a battery unit that serves as a power source for the heater member, and a control unit for controlling the heater member, and the non-combustion-heating-type tobacco being to be inserted into the electric heating device in such a manner that the non-combustion-heating-type tobacco comes into contact with the heater member.

Advantageous Effects of Invention

[0011] According to the present invention, it is possible to provide the non-combustion-heating-type tobacco in which the generation of a substance that adversely affects the smoke taste and so forth can be suppressed when the non-combustion-heating-type tobacco is used and in which a desired appearance of the wrapped portion can be provided, and to provide the electrically heated tobacco product.

Brief Description of Drawings

[0012]

[Fig. 1] Fig. 1 is a schematic view illustrating one embodiment of a non-combustion-heating-type tobacco in which a resin composition is applied to tipping paper.
[Fig. 2] Fig. 2 is a schematic view illustrating another embodiment of a non-combustion-heating-type tobacco in which a resin composition is applied to tipping paper.
[Fig. 3] Fig. 3 is a schematic view illustrating still another embodiment of a non-combustion-heating-type tobacco in which a resin composition is applied to tipping paper.
[Fig. 4] Fig. 4 is a schematic view illustrating one embodiment of an electrically heated tobacco product in which the outer circumferential surface of a tobacco rod is heated.
[Fig. 5] Fig. 5 is a schematic view illustrating one embodiment of an electrically heated tobacco product in which the interior of a tobacco rod is heated.

Description of Embodiments

[0013] Embodiments of the present invention will be described in detail below. However, the embodiments described below are examples (representative examples) of the embodiments of the present invention, and the present invention is not limited thereto as long as the gist thereof is maintained.

[0014] In the schematic views of Figs. 1 to 3 illustrating non-combustion-heating-type tobaccos, various components are enlarged or reduced in size as appropriate to facilitate illustration, and are not illustrated in actual sizes or ratios according to the embodiments of the present invention.

[0015] The concept of a wrapped portion is a portion including tipping paper and a resin composition applied to the tipping paper.

[0016] In addition, in the present invention, an "outer side" of the wrapped portion means a side that comes into contact with the user's lips during use of the non-combustion-heating-type tobacco, and an "inner side" of the wrapped portion means a side opposite to the above-described side.

[0017] In this specification, when a range is expressed using numerical values or values of physical properties with "to" interposed therebetween, the values before and after "to" are meant to be included in the range.

<Non-combustion-heating-type Tobacco>

[0018] A non-combustion-heating-type tobacco according to an embodiment of the present invention (hereinafter, also referred to simply as a "non-combustion-heating-type tobacco") includes a tobacco rod portion, a mouthpiece portion, and a wrapped portion in which the tobacco rod portion and the mouthpiece portion are wrapped with tipping paper, in which at least part of the tipping paper included in the wrapped portion is coated with a resin composition,

a region coated with the resin composition includes a heating area when the non-combustion-heating-type tobacco is used, and
the resin composition contains one or more resins selected from the group consisting of ethyl cellulose, hydroxyethyl cellulose, methyl cellulose, hydroxyethylmethyl cellulose, carboxymethyl cellulose, alkyd resins, polyamide resins, styrene-acrylic resins, butyl methacrylate-methyl methacrylate resins, and polyester resins, and a plasticizer.

[0019] Fig. 1 illustrates an example of the non-combustion-heating-type tobacco according to the above-described embodiment. Hereinafter, the non-combustion-heating-type tobacco will be described with reference to Fig. 1. In Fig. 1, part of one side of the tipping paper is illustrated as being uniformly coated with the resin composition; however, the present invention is not limited thereto, and a concentration difference may occur in the coated part. This also applies to other drawings.

[0020] The direction h in Fig. 1 is the longitudinal direction of the non-combustion-heating-type tobacco.

[0021] The non-combustion-heating-type tobacco preferably has a pillar shape that satisfies a shape with an aspect ratio, as defined below, of 1 or more.

$$\text{Aspect ratio} = h/w$$

where w is the width of the bottom surface of the pillar-shaped body (the width of the bottom surface adjacent to the tobacco rod portion, in the present invention), and h is the height. Preferably, $h \geq w$. However, in the present invention, the longitudinal direction is defined as the direction indicated by h, as described above. Thus, even when $w \geq h$, the direction indicated by h is referred to as the longitudinal direction for convenience. The shape of the bottom surface is not limited and may be, for example, polygonal, rounded polygonal, circular, or elliptic. The width w is the diameter when the bottom surface is circular, the major diameter when the bottom surface is elliptic, and the diameter of a circumscribed circle or the major diameter of a circumscribed ellipse when the bottom surface is polygonal or rounded polygonal. For example, in the embodiment illustrated in Fig. 1, the bottom surface is circular; thus, its diameter can be determined. The diameter is the width w, and the length orthogonal to the width w is the height h.

[0022] The length h of the non-combustion-heating-type tobacco in the longitudinal direction is not particularly limited, and is, for example, typically 35 mm or more, preferably 40 mm or more, more preferably 45 mm or more. The length h is typically 105 mm or less, preferably 95 mm or less, more preferably 85 mm or less.

[0023] The width w of the bottom surface of the pillar-shaped body of the non-combustion-heating-type tobacco is not particularly limited, and is, for example, typically 5 mm or more, preferably 5.5 mm or more. The width w is typically 10 mm or less, preferably 9 mm or less, more preferably 8 mm or less.

[0024] Each component included in the non-combustion-heating-type tobacco will be described below.

<Wrapped Portion>

[0025] As illustrated in Fig. 1, in an embodiment of the present invention, a wrapped portion in which a tobacco rod portion 10 and a mouthpiece portion 11 are wrapped with tipping paper 12 is provided. Although not illustrated in Fig. 1, in the tobacco rod portion 10, a tobacco filler is wrapped with wrapping paper as described below. Moreover, at least part of the tipping paper is coated with a resin composition 13. The region coated with the resin composition 13 includes a heating area when the non-combustion-heating-type tobacco is used. Specifically, the region coated with the resin composition 13 preferably includes an end portion of the tipping paper adjacent to the tobacco rod, as illustrated in Fig. 1.

[0026] In this embodiment, for example, a color, a pattern, or a character can be imparted to the region coated with the resin composition to provide a desired appearance. In addition, since the resin composition has a specific composition, an unpleasant flavor is not generated during use even when the resin composition is applied to the region including the heating area of the non-combustion-heating-type tobacco.

[0027] The region coated with the resin composition preferably includes at least a region having a length of 10% or less of the entire length of the tipping paper in the longitudinal direction of the non-combustion-heating-type tobacco and extending from an end portion of the tipping paper adjacent to the tobacco rod toward an end portion of an inhalation port. Typically, a color, a pattern, a character, or the like is often imparted to the above-described region of the tipping paper included in the non-combustion-heating-type tobacco. Thus, applying the resin composition to the region including at least the above-described region of the tipping paper is a preferred embodiment for imparting a desired appearance to the non-combustion-heating-type tobacco. In one embodiment, the region coated with the resin composition may include a region having a length of, for example, 20% or less, 40% or less, 60% or less, or 80% or less of the entire length of the tipping paper of the non-combustion-heating-type tobacco in the longitudinal direction and extending from the end portion of the tipping paper adjacent to the tobacco rod toward the end portion of the inhalation port. Alternatively, the entire length of the tipping paper, i.e., the entire surface of the tipping paper, may be coated with the resin composition. These embodiments can be appropriately changed in accordance with the position where a color, a pattern, a character, or the like is imparted onto the tipping paper.

[0028] As another embodiment, for example, the region coated with the resin composition may include at least a region extending from the end portion of the wrapped portion adjacent to the tobacco rod in the longitudinal direction to a position 5 mm or less from the end portion of the wrapped portion. The reason why this embodiment is preferred is that typically, a color, a pattern, a character, or the like is often imparted to the region of the tipping paper included in the non-combustion-heating-type tobacco. In one embodiment, the region coated with the resin composition may include a region extending from the end portion of the wrapped portion adjacent to the tobacco rod in the longitudinal direction to a position 7 mm or less, 9 mm or less, 11 mm or less, 13 mm or less, 15 mm or less, or 17 mm or less from the end portion of the wrapped portion. Alternatively, the entire length of the wrapped portion, i.e., the entire surface of the wrapped portion, may be coated with the resin composition. These embodiments can be appropriately changed in accordance with the position where a color, a pattern, a character, or the like is imparted onto the tipping paper.

[Tipping Paper]

[0029] The material of the tipping paper included in the wrapped portion 12 is not particularly limited, and paper composed of general plant fibers (pulp), a sheet composed of polymer-based (e.g., polypropylene, polyethylene, or nylon) chemical fibers, a polymer-based sheet, metal foil, such as aluminum foil, can be used. The tipping paper used here refers to a sheet that connects multiple segments in the non-combustion-heating-type tobacco, for example, connects the tobacco rod portion and the mouthpiece portion.

[0030] A method for producing the tipping paper is not particularly limited, and a typical method can be employed. For example, in one embodiment, in the case of using pulp as a main component, an example thereof is a method for adjusting and uniformizing the formation in a papermaking process using pulp with, for example, a Fourdrinier machine, a cylinder paper machine, or a cylinder short combined paper machine. If necessary, a wet strength agent may be added to impart water resistance to the wrapping paper, or a sizing agent may be added to adjust the printing condition of the wrapping paper. In addition, internal assistants for papermaking, such as aluminum sulfate, various anionic, cationic, nonionic, or amphoteric yield improvers, filterability improvers, and paper strengthening agents, and additives for papermaking, such as dyes, pH adjusters, antifoaming agents, pitch control agents, and slime control agents can be added.

[0031] The pulp may be produced from wood pulp, such as softwood pulp or hardwood pulp, or may be produced by mixing non-wood pulp typically used for wrapping paper of smoking articles, such as flax pulp, hemp pulp, sisal pulp, or esparto. Regarding the type of pulp, chemical pulp produced by, for example, a kraft cooking method, an acidic, neutral, or alkaline sulfite cooking method, or a soda-salt cooking method, ground pulp, chemi-mechanical pulp, thermomechanical pulp, or the like can be used.

[0032] The height of the tipping paper 11 in the longitudinal direction is not particularly limited, and is usually 15 mm or more, preferably 20 mm or more, more preferably 25 mm or more, from the viewpoints of the amount of aerosol

delivered and production suitability. The height is usually 55 mm or less, preferably 50 mm or less.

[0033] The thickness of the tipping paper 11 is not particularly limited, and is usually 30 μm or more, preferably 35 μm or more, from the viewpoints of the amount of aerosol delivered and production suitability. The thickness is usually 150 μm or less, preferably 140 μm or less.

[0034] The basis weight of the tipping paper 11 is not particularly limited, and is usually 30 g/m^2 or more, preferably 35 g/m^2 or more, from the viewpoints of the amount of aerosol be delivered and production suitability. The basis weight is usually 150 g/m^2 or less, preferably 140 g/m^2 or less.

[0035] The permeability of the tipping paper 11 is not particularly limited, and is preferably 10 Coresta units or less from the viewpoints of the amount of aerosol delivered and production suitability.

[Resin Composition]

[0036] The resin composition applied onto the tipping paper contains one or more resins selected from the group consisting of ethyl cellulose, hydroxyethyl cellulose, methyl cellulose, hydroxyethylmethyl cellulose, carboxymethyl cellulose, alkyd resins, polyamide resins, styrene-acrylic resins, butyl methacrylate-methyl methacrylate resins, and polyester resins, and a plasticizer.

[0037] The application of the resin composition to at least part of the tipping paper included in the wrapped portion makes it possible to impart a desired appearance to the wrapped portion of the non-combustion-heating-type tobacco or to form a base for such a desired appearance. In the case where the base is formed, when printing is performed on the base by a means different from that for the resin composition, the fixability of the ink can be improved, and the penetration and bleeding of the ink into the tipping paper can be prevented. Moreover, when the base is formed, a surface of the base can be smoothed to enhance the reproducibility of a desired design.

[0038] In the case where printing is performed on the tipping paper by a means different from that for the resin composition, when the resin composition is applied so as to cover the printed portion, it is possible to prevent the printed portion from peeling off or blurring.

[0039] The region coated with the resin composition includes a heating area when the non-combustion-heating-type tobacco is used. In the related art, when some coating agent is applied to a heating area, an undesirable flavor is generated. However, when the resin composition according to the present invention is applied, such a problem does not occur.

[0040] Any of cellulose ethers, such as ethyl cellulose, hydroxyethyl cellulose, methyl cellulose, hydroxyethylmethyl cellulose, and carboxymethyl cellulose, can be appropriately selected from commercially available cellulose ethers and used.

[0041] Among these cellulose ethers, the following can be used: in a 2% by weight aqueous solution thereof, the viscosity at 20°C is, for example, 3 to 140,000 mPa s.

[0042] For the synthesis of an alkyd resin, for example, a polybasic acid, a fatty acid, and a polyhydric alcohol are used. Examples of the polybasic acid include phthalic anhydride, isophthalic acid, terephthalic acid, benzoic acid, rosin, tetrahydrophthalic anhydride, maleic anhydride, adipic acid, and succinic acid. Examples of the fatty acid include palmitic acid, stearic acid, oleic acid, linoleic acid, and linolenic acid. Examples of the polyhydric alcohol include glycerine, pentaerythritol, ethylene glycol, propylene glycol, neopentyl glycol, and trimethylolpropane. An alkyd resin can be obtained by reacting these in desired proportions.

[0043] The weight-average molecular weight of the alkyd resin can be, for example, 10,000 to 200,000. The weight-average molecular weight can be calculated as a molecular weight in terms of polystyrene by calculating a molecular weight at each elution time from an elution curve of monodisperse polystyrene using gel permeation chromatography (GPC).

[0044] Examples of the polyamide resin include those obtained by reacting a diamine selected from ethylenediamine, isophoronediamine, hexamethylenediamine, 1,12-dodecanediamine, 2-methylpentamethylenediamine, 2-ethyltetramethylenediamine, 1,2-diaminocyclohexane, 1,3-diaminocyclohexane, cis-1,4-diaminocyclohexane, and trans-1,4-diaminocyclohexane with a dicarboxylic acid, ester, or anhydride derivative selected from phthalic acid, phthalic anhydride, isophthalic acid, terephthalic acid, 2,6-naphthalenedicarboxylic acid, succinic acid, succinic anhydride, glutaric acid, adipic acid, azelaic acid, sebacic acid, undecanedioic acid, dodecanedioic acid, a mixture of succinic acid, glutaric acid, and adipic acid, cyclohexanedicarboxylic acid, dimethyl isophthalate, dimethyl phthalate, dimethyl terephthalate, dimethyl 2,6-naphthalenedicarboxylate, diethyl oxalate, dimethyl adipate, dimethyl glutarate, and methyl succinate.

[0045] The weight-average molecular weight of the polyamide resin can be, for example, 10,000 to 200,000.

[0046] The weight-average molecular weight of the polyamide resin can be calculated as a molecular weight in terms of poly(methyl methacrylate) by calculating a molecular weight at each elution time from an elution curve of monodisperse poly(methyl methacrylate) using gel permeation chromatography (GPC).

[0047] The styrene-acrylic resin can be obtained by copolymerizing a styrene-based monomer and a (meth)acrylic acid-based monomer. The styrene-acrylic resin also includes a styrene-methacrylic resin. Examples of the styrene-

based monomer include styrene, α-methylstyrene, o-methylstyrene, and p-methylstyrene. They may be used alone or in combination as a mixture. Styrene is preferred. Examples of the (meth)acrylic acid-based monomer include acrylic acid and methacrylic acid. Methacrylic acid is preferred.

[0048] The weight-average molecular weight of the styrene-acrylic resin is, for example, 140,000 to 400,000. The weight-average molecular weight can be determined by the same method as that for the alkyd resin described above.

[0049] The butyl methacrylate-methyl methacrylate resin is a copolymer obtained by copolymerizing butyl methacrylate and methyl methacrylate in freely-selected proportions, and typically has a weight-average molecular weight of 20,000 to 200,000. The weight-average molecular weight can be determined by the same method as that for the alkyd resin described above.

[0050] The polyester resin can be typically obtained by subjecting a polybasic acid and a polyhydric alcohol to an esterification reaction by a known method.

[0051] The polybasic acid is a compound containing two or more carboxy groups in one molecule. Examples thereof include aromatic polybasic acids, such as terephthalic acid, isophthalic acid, phthalic acid, naphthalenedicarboxylic acid, 4,4'-biphenyldicarboxylic acid, and diphenylmethane-4,4'-dicarboxylic acid, and anhydrides thereof; alicyclic dicarboxylic acids, such as hexahydroisophthalic acid, hexahydroterephthalic acid, hexahydrophthalic acid, and tetrahydrophthalic acid, and anhydrides thereof; aliphatic polybasic acids, such as adipic acid, sebacic acid, suberic acid, succinic acid, glutaric acid, maleic acid, chloromaleic acid, fumaric acid, dodecanedioic acid, pimelic acid, azelaic acid, itaconic acid, citraconic acid, and dimer acids, and anhydrides thereof; lower alkyl esters, such as methyl esters and ethyl esters of these dicarboxylic acids; and trivalent or higher polybasic acids, such as trimellitic acid, trimellitic anhydride, pyromellitic acid, pyromellitic anhydride, trimesic acid, methylcyclohexenetricarboxylic acid, and tetrachlorohexenepolybasic acid, and anhydrides thereof.

[0052] The polyhydric alcohol is a compound containing two or more hydroxy groups in one molecule. Examples thereof include dihydric alcohols, such as ethylene glycol, propylene glycol, diethylene glycol, trimethylene glycol, tetraethylene glycol, triethylene glycol, dipropylene glycol, 1,4-butanediol, 1,3-butanediol, 2,3-butanediol, 1,2-butanediol, 3-methyl-1,2-butanediol, 1,2-pentanediol, 1,5-pentanediol, 1,4-pentanediol, 2,4-pentanediol, 2,3-dimethyltrimethylene glycol, tetramethylene glycol, 3-methyl-4,3-pentanediol, 3-methyl-4,5-pentanediol, 2,2,4-trimethyl-1,3-pentanediol, 1,6-hexanediol, 1,5-hexanediol, 1,4-hexanediol, 2,5-hexanediol, neopentyl glycol, and hydroxypivalic acid neopentyl glycol ester; polylactone diols obtained by adding lactones, such as ε-caprolactone, to these dihydric alcohols; ester diols, such as bis(hydroxyethyl) terephthalate; polyether diols, such as alkylene oxide adducts of bisphenol-A, polyethylene glycol, polypropylene glycol, and polybutylene glycol; monoepoxy compounds, such as α-olefin epoxides, e.g., propylene oxide and butylene oxide, and Cardura E10 [trade name, glycidyl ester of synthetic highly branched saturated fatty acid, available from Shell Chemicals]; trihydric or more alcohols, such as glycerine, trimethylolpropane, trimethylolethane, diiglycerine, triglycerine, 1,2,6-hexanetriol, pentaerythritol, dipentaerythritol, sorbitol, and mannitol; polylactone polyols obtained by adding lactones, such as ε-caprolactone, to these trihydric or more alcohols; and alicyclic polyhydric alcohols, such as 1,4-cyclohexanedimethanol, tricyclodecanedimethanol, hydrogenated bisphenol A, hydrogenated bisphenol F, hydrogenated bisphenol A, and hydrogenated bisphenol F.

[0053] The number-average molecular weight of the polyester resin may be, for example, 5,000 to 100,000.

[0054] The number-average molecular weight of the polyester resin can be calculated as a molecular weight in terms of polystyrene by calculating a molecular weight at each elution time from an elution curve of monodisperse polystyrene using gel permeation chromatography (GPC).

[0055] The weight-molecular weight of the alkyd resin, the polyamide resin, the styrene-acrylic resin, the butyl methacrylate-methyl methacrylate resin, and the polyester resin can be controlled by, for example, the reaction temperature and the residence time in the polymerization step, the type and amount of polymerization initiator, the type and amount of chain transfer agent, and the type and amount of solvent used in the polymerization. As the alkyd resin, the polyamide resin, the styrene-acrylic resin, the butyl methacrylate-methyl methacrylate resin, and the polyester resin, commercially available products used in the technical field of paints and printing can be used.

[0056] Among the above-mentioned resins, ethyl cellulose is preferably used. The resin composition does not contain nitrocellulose, which is used as a conventional coating agent; thus, an undesirable flavor is not generated when the non-combustion-heating-type tobacco is heated. Nitrocellulose is typically obtained by treating cellulose with a mixed acid of nitric and sulfuric acids. The nitrocellulose is decomposed by heating to produce nitric acid, and the nitric acid reacts with a minor alkaloid in the tobacco raw material to produce TSNA. This TSNA is responsible for the undesirable flavor. TSNA is a generic name for tobacco-specific nitrosamines. Representative examples thereof include N'-nitrosonornicotine (NNN), 4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone (NNK), N'-nitrosoanatabine (NAT), and N'-nitrosoanabasine (NAB).

[0057] The resin composition contains a plasticizer. When the resin composition contains the plasticizer, the coatability of the resin composition on the tipping paper can be improved. The fact that the resin composition contains the plasticizer contributes to, for example, an improvement in flexibility of the resin composition, the prevention of cracking of the coated surface, the prevention of curling of the coated surface, and an increase in the gloss of the coated surface. In particular,

the prevention of curling of the coated surface is significantly improved when the resin composition contains a resin, such as ethyl cellulose, other than nitrocellulose. An example of a plasticizer is triacetin.

[0058] The resin composition may contain a solvent for dissolving the resin and the plasticizer.

[0059] The proportion by weight of the resin in the resin composition can be, for example, 5 to 40 parts by weight, preferably 10 to 30 parts by weight, based on 100 parts by weight of the resin composition.

[0060] Regarding the proportions of the resin and the plasticizer in the resin composition, the proportion by weight of the plasticizer is, for example, preferably 0.05 to 0.5, more preferably 0.1 to 0.3, based on 1 of the resin.

[0061] Regarding the coating amount of resin composition on the tipping paper, the coating amount of solid content originating from the resin composition on the tipping paper is preferably 0.0001% to 3% by weight. With such a coating amount, it is possible to impart a desired appearance to the wrapped portion of the non-combustion-heating-type tobacco and to satisfactorily form a base for imparting such a desired appearance.

[0062] When the resin composition contains a coloring component such as a pigment or dye described below and a thermal developer, the resin composition can impart a desired appearance to the wrapped portion of the non-combustion-heating-type tobacco. Even if the resin composition does not contain the coloring component or thermal developer, the resin composition can form a base for imparting a desired appearance to the tipping paper. When the resin composition is applied not as a base but to a portion on which printing has been performed in advance by another means, the resin composition can play a role in preventing the printed portion from peeling and smearing.

[0063] The coating of the solid content originating from the resin composition in the region coated with the resin composition on the tipping paper may be or need not be uniform in both thickness and distribution. In a preferred embodiment, the coating region of the resin composition can include a plain portion and a portion having at least one of a color, a character, and a pattern. To implement this embodiment, one resin composition for imparting at least one of a color, a character, and a pattern may be applied only once, or two or more different resin compositions can be applied in multiple times.

[0064] The resin composition may contain a coloring component. Examples of the coloring component include one or more selected from pigments and dyes.

[0065] Examples of the pigment include titanium dioxide, calcium carbonate, iron oxide, mica, aluminum, copper, and silicon dioxide.

[0066] Examples of the dye can include C.I. Pigment Yellow 42, C.I. Pigment Yellow 100, C.I. Pigment Black 11, C.I. Pigment Blue 78, C.I. Pigment Yellow 139, Quinoline Yellow, C.I. Pigment Black 7, C.I. Pigment Red 48: 1, C.I. Pigment Red 48:3, C.I. Pigment Yellow 185, C.I. Pigment blue 15, C.I. Pigment Green 7, C.I. Pigment Red 172, C.I. Pigment Red 57:1, C.I. Pigment Yellow 104, C.I. Pigment Blue 63, C.I. Pigment Violet 23, and C.I. Pigment Violet 37.

[0067] The coloring component content of the resin composition can be, for example, 0.00005% by weight or more and 0.8% by weight or less, in accordance with the type of coloring component.

[0068] The pigment content of the resin composition varies in accordance with the type of pigment. Examples of the pigment content can include 0.8% by weight or less for titanium dioxide, 0.7% by weight or less for calcium carbonate, 0.09% by weight or less for iron oxide or mica, and 0.01% by weight or less for aluminum, copper, or silicon dioxide.

[0069] The dye content of the resin composition varies in accordance with the type of dye. Examples of the dye content can include 0.01% by weight or less for C.I. Pigment Yellow 100, 0.005% by weight or less for C.I. Pigment Black 11, C.I. Pigment Blue 78, C.I. Pigment Yellow 139, or Quinoline Yellow, 0.001% by weight or less for C.I. Pigment Black 7, C.I. Pigment Red 48: 1, C.I. Pigment Red 48:3, or C.I. Pigment Yellow 185, 0.0005% by weight or less for C.I. Pigment Blue 15, C.I. Pigment Green 7, C.I. Pigment Red 172, C.I. Pigment Red 57: 1, or C.I. Pigment Yellow 104, and 0.0001% by weight or less for C.I. Pigment Blue 63, C.I. Pigment Violet 23, or C.I. Pigment Violet 37.

[0070] The resin composition may contain a thermal developer. The thermal developer is a substance that is originally colorless but becomes colored by heating. Specifically, it is a substance that becomes colored as the non-combustion-heating-type tobacco is heated.

[0071] Examples of the thermal developer can include one or more selected from organic acids and salts thereof, monosaccharides, disaccharides, polysaccharides, and amino acids. Among these, when multiple types thereof are used in combination, examples thereof include a combination of an organic acid or a salt thereof and one or more sugars selected from monosaccharides, disaccharides, and polysaccharides (including a combination of an organic acid or a salt thereof and a monosaccharide, a combination of an organic acid or a salt thereof and a disaccharide, and a combination of an organic acid or a salt thereof and a polysaccharide), a combination of a monosaccharide and an amino acid, and a combination of a monosaccharide and a polysaccharide.

[0072] The concentration of the thermal developer in the resin composition is not particularly limited, and can be, for example, 0.01% to 3% by weight, preferably 0.2% to 2% by weight.

[0073] Examples of the organic acid or a salt thereof include one or more selected from acetic acid, potassium acetate, sodium acetate, citric acid, potassium citrate, sodium citrate, tartaric acid, potassium tartrate, sodium tartrate, phosphoric acid, sodium phosphate, potassium phosphate, malic acid, sodium malate, magnesium malate, lactic acid, and calcium lactate. The use of these organic acids or salts thereof is considered to reduce the amount of heat required for the

oxidation reaction of the pulp of the base paper for the tipping paper to cause color development.

[0074] The monosaccharide is preferably one or more selected from fructose, galactose, and glucose. The disaccharide is preferably one or more selected from maltose, lactose, and sucrose.

[0075] The polysaccharide is preferably one or more selected from carboxymethyl cellulose, carrageenan, pectin, and starch.

[0076] When the above-described monosaccharide, disaccharide, or polysaccharide is used, color development is considered to occur due to a caramelization reaction.

[0077] The amino acid is preferably one or more selected from valine, leucine, isoleucine, glutamine, alanine, asparagine, and arginine. These amino acids are considered to be colored by a Maillard reaction with a carbonyl group contained in the pulp of the base paper for the wrapping paper.

[0078] The aqueous solution of the thermal developer is transparent in appearance. Even if the thermal developer is added to the base paper for the tipping paper, there is no change in the color of the tipping paper. In other words, the thermal developer is transparent in appearance before heating. A color that has not appeared in the base paper for the tipping paper before use of the non-combustion-heating-type tobacco can be developed on the tipping paper by heating at the time of use.

[0079] A method for applying the resin composition to the tipping paper is not particularly limited, and a typical application method can be employed. The resin composition can be used in the form of an aqueous solution or an ethyl acetate solution. The aqueous solution or ethyl acetate solution can be applied to the tipping paper according to an embodiment of the present invention by an appropriate printing method such as gravure printing. The resin composition may be applied to the tipping paper according to an embodiment of the present invention by a known means other than the printing, such as a method for applying an opaque ink by ink-jet printing, a spraying method, or an impregnation method.

[0080] The resin composition needs to be applied to at least part of the surface of the tipping paper that constitutes the outer surface of the non-combustion-heating-type tobacco, but may be further applied to the inner surface.

[0081] The solid content, originating from the resin composition, on the tipping paper can be measured by absorptiometry described below.

[0082] Standard samples for calibration curve are prepared by a method described below and subjected to absorptiometry measurement. According to ASTM D3133-01, a calibration curve is prepared from the results of the absorptiometry measurement of the standard samples for calibration curve. A measurement sample is prepared by a method described below, and subjected to absorptiometry measurement. From the calibration curve and the results of the absorptiometry measurement of the measurement sample, it is possible to determine the weight of the solid content originating from the resin composition in the measurement sample.

<Preparation of Standard Sample for Calibration Curve>

[0083]

(1) About 6 g of the standard sample (resin composition before coating) is weighed in a container, such as a recovery flask, and then concentrated by removing volatile components with an evaporator.
(2) The resulting non-volatile components are transferred to a 100-ml volumetric flask with a pipet while being dissolved in acetone, and diluted to 100 ml with acetone.
(3) Four 50-ml recovery flasks are provided and charged with 0, 1, 3, and 5 ml, respectively, of the solution prepared in (2). Acetone is added thereto in amounts of 10, 9, 7, and 5 ml, respectively, in such a manner that the total amount is 10 ml. Then 10 ml of 10% KOH is added to each of these recovery flasks. Each flask is equipped with condenser tubes and refluxed for 1 hour on a constant-temperature water bath at 60°C.
(4) After the refluxing, the mixture is cooled to room temperature on ice and filtered with filter paper. Then, the resulting filtrate is placed in a 50-ml volumetric flask and diluted to 50 ml with an acetonewater (2/1 by weight) mixed solution.

<Preparation of Measurement Sample>

[0084]

(1) The tipping paper included in the wrapped portion is peeled off from the non-combustion-heating-type tobacco and is cut into small pieces. Then the small pieces of the tipping paper are placed in a container such as an Erlenmeyer flask. After the addition of 100 ml of acetone, ultrasonic extraction is performed for 30 minutes.
(2) The extract is transferred to a 300-ml recovery flask. Acetone is evaporated with an evaporator. Then 10 ml of acetone and 10 ml of 10% KOH are added, and the mixture is refluxed on a hot water bath at 60°C for 1 hour.
(3) The recovery flask is cooled to room temperature on ice, and filtration is performed. Then, the resulting filtrate

is placed in a 50-ml measuring flask and diluted to 50 ml with an acetone/water (2/1 by weight) mixed solution.

<Tobacco Rod Portion>

[0085] The configuration of the tobacco rod portion 10 is not particularly limited, and can be a typical configuration. For example, a tobacco filler wrapped with a wrapping paper can be used.

[Tobacco Filler]

[0086] The configuration of the tobacco filler is not particularly limited. Examples thereof can include a tobacco filler composed of a composition containing shredded tobacco (hereinafter, also referred to as a "first tobacco filler"), a tobacco filler composed of multiple tobacco sheets described below (hereinafter, also referred to as a "second tobacco filler"), and a tobacco filler composed of a single tobacco sheet (hereinafter, also referred to as a "third tobacco filler").

[0087] The tobacco rod portion preferably has a pillar shape. In this case, the aspect ratio represented by the height of the tobacco rod portion in the longitudinal direction to the width of the bottom surface of the tobacco rod portion is preferably 1 or more.

[0088] The shape of the bottom surface is not limited and may be polygonal, rounded polygonal, circular, or elliptical. The width is the diameter when the bottom surface is circular, the major diameter when the bottom surface is elliptic, and the diameter of a circumscribed circle or the major diameter of a circumscribed ellipse when the bottom surface is polygonal or rounded polygonal. For example, in each of the embodiments illustrated in Figs. 1 to 3, the bottom surface is circular. Thus, the diameter is the width, and the length orthogonal thereto is the height. The tobacco filler constituting the tobacco rod preferably has a height of about 12 to about 70 mm and a width of about 4 to about 9 mm.

[0089] The tobacco rod portion may include a fitting portion with, for example, a heater member for heating the non-combustion-heating-type tobacco.

[0090] First, the first filler will be described. The material of the shredded tobacco contained in the first filler is not particularly limited, and known materials, such as laminae and midribs, can be used. A material obtained by grinding dried tobacco leaves to an average particle size of 20 to 200 μm, homogenizing the ground tobacco, processing the homogenized tobacco into a sheet (hereinafter, also referred to simply as a "homogenized sheet"), and shredding the sheet may be used. Furthermore, what is called a strand-type material, which is obtained by shredding a homogenized sheet having a length comparable to the longitudinal length of the tobacco rod in a direction substantially parallel to the longitudinal direction of the tobacco rod and is loaded into the tobacco rod, may also be used. The width of the shredded tobacco is preferably 0.5 to 2.0 mm for the loading into the tobacco rod. In the case of a tobacco rod having a circumference of 22 mm and a length of 20 mm, the amount of tobacco filler contained in the tobacco rod is, for example, 200 to 800 mg/rod portion, preferably 250 to 600 mg/rod. For the tobacco leaves used to prepare the shredded tobacco and the homogenized sheet, various types of tobacco can be used. Examples thereof include flue-cured tobacco, burley tobacco, oriental tobacco, domestic tobacco, nicotiana tabacum tobacco, nicotiana rustica tobacco, and mixtures thereof. For the mixtures, these various types of tobacco may be appropriately blended so as to achieve the desired taste. Details of the types of tobacco are disclosed in "Tabako-no-Jiten (Encyclopedia of Tobacco) by Tobacco Academic Studies Center, March 31, 2009". For a method for producing the homogenized sheet, that is, a method for grinding tobacco leaves and processing it into a homogenized sheet, there are multiple conventional methods. A first method is one in which a paper sheet is produced by a papermaking process. A second method is one in which an appropriate solvent, such as water, is mixed with ground tobacco leaves so as to be uniform, and then the uniform mixture is cast thinly on a metal plate or metal plate belt and dried to produce a cast sheet. A third method is one in which an appropriate solvent, such as water, is mixed with ground tobacco leaves so as to be uniform, and the uniform mixture is extruded into a sheet form to produce a rolled sheet. Details of the types of the homogenized sheet are disclosed in "Tabako-no-Jiten (Encyclopedia of Tobacco) by Tobacco Academic Studies Center, March 31, 2009".

[0091] The water content of the tobacco filler is, for example, 10% to 15% by weight, preferably 11% to 13% by weight, based on the total amount of tobacco filler. Such a water content suppresses the occurrence of a stain on the wrapping paper and improves the machinability during the production of the tobacco rod.

[0092] The size of the shredded tobacco contained in the first tobacco filler and a method for preparing the shredded tobacco are not particularly limited. For example, dried tobacco leaves cut to a width of 0.5 to 2.0 mm may be used.

[0093] When a ground product of the homogenized sheet is used, a product obtained by grinding dried tobacco leaves to an average particle size of about 20 to about 200 μm, homogenizing the ground tobacco, processing it into a sheet, and shredding the sheet into a width of 0.5 to 2.0 mm may be used.

[0094] The first tobacco filler contains an aerosol-source material that generates aerosol smoke. The type of aerosol-source material is not particularly limited, and extracts from various natural products and/or components thereof can be selected in accordance with the intended use. Examples of the aerosol-source material can include glycerine, propylene glycol, triacetin, 1,3-butanediol, and mixtures thereof.

[0095] The aerosol-source material content of the first tobacco filler is not particularly limited. From the viewpoint of sufficiently generating aerosols and imparting a good smoke taste, the aerosol-source material content is typically 5% by weight or more, preferably 10% by weight or more, and typically 50% by weight or less, preferably 15% to 25% by weight, based on the total amount of tobacco filler.

[0096] The first tobacco filler may contain a flavor. The type of flavor is not particularly limited. From the viewpoint of imparting a good smoke taste, examples thereof include acetanisole, acetophenone, acetylpyrazine, 2-acetylthiazole, alfalfa extract, amyl alcohol, amyl butyrate, trans-anethole, star anise oil, apple juice, Peru balsam oil, beeswax absolute, benzaldehyde, benzoin resinoid, benzyl alcohol, benzyl benzoate, benzyl phenylacetate, benzyl propionate, 2,3-butanedione, 2-butanol, butyl butyrate, butyric acid, caramel, cardamom oil, carob absolute, β-carotene, carrot juice, L-carvone, β-caryophyllene, cassia bark oil, cedarwood oil, celery seed oil, chamomile oil, cinnamic aldehyde, cinnamic acid, cinnamyl alcohol, cinnamyl cinnamate, citronella oil, DL-citronellol, clary sage extract, cocoa, coffee, cognac oil, coriander oil, cuminaldehyde, davana oil, δ-decalactone, γ-decalactone, decanoic acid, dill herb oil, 3,4-dimethyl-1,2-cyclopentanedione, 4,5-dimethyl-3-hydroxy-2,5-dihydrofuran-2-one, 3,7-dimethyl-6-octenoic acid, 2,3-dimethylpyrazine, 2,5-dimethylpyrazine, 2,6-dimethylpyrazine, ethyl 2-methylbutyrate, ethyl acetate, ethyl butyrate, ethyl hexanoate, ethyl isovalerate, ethyl lactate, ethyl laurate, ethyl levulinate, ethyl maltol, ethyl octanoate, ethyl oleate, ethyl palmitate, ethyl phenylacetate, ethyl propionate, ethyl stearate, ethyl valerate, ethyl vanillin, ethyl vanillin glucoside, 2-ethyl-3,(5 or 6)-dimethylpyrazine, 5-ethyl-3-hydroxy-4-methyl-2(5H)-furanone, 2-ethyl-3-methylpyrazine, eucalyptol, fenugreek absolute, genet absolute, gentian root infusion, geraniol, geranyl acetate, grape juice, guaiacol, guava extract, γ-heptalactone, γ-hexalactone, hexanoic acid, cis-3-hexen-1-ol, hexyl acetate, hexyl alcohol, hexyl phenylacetate, honey, 4-hydroxy-3-pentenoic acid lactone, 4-hydroxy-4-(3-hydroxy-1-butenyl)-3,5,5-trimethyl-2-cyclohexen-1-one, 4-(p-hydroxyphenyl)-2-butanone, sodium 4-hydroxyundecanoate, immortelle absolute, β-ionone, isoamyl acetate, isoamyl butyrate, isoamyl phenylacetate, isobutyl acetate, isobutyl phenylacetate, jasmine absolute, kola nut tincture, labdanum oil, terpeneless lemon oil, glycyrrhiza extract, linalool, linalyl acetate, lovage root oil, maltol, maple syrup, menthol, menthone, L-menthyl acetate, p-methoxybenzaldehyde, methyl-2-pyrrolyl ketone, methyl anthranilate, methyl phenylacetate, methyl salicylate, 4'-methylacetophenone, methylcyclopentenolone, 3-methylvaleric acid, mimosa absolute, molasses, myristic acid, nerol, nerolidol, γ-nonalactone, nutmeg oil, δ-octalactone, octanal, octanoic acid, orange flower oil, orange oil, orris root oil, palmitin acid, ω-pentadecalactone, peppermint oil, petitgrain Paraguay oil, phenethyl alcohol, phenethyl phenylacetate, phenylacetic acid, piperonal, plum extract, propenyl guaethol, propyl acetate, 3-propylidene phthalide, prune juice, pyruvic acid, raisin extract, rose oil, rum, sage oil, sandalwood oil, spearmint oil, styrax absolute, marigold oil, tea distillate, α-terpineol, terpinyl acetate, 5,6,7,8-tetrahydroquinoxaline, 1,5,5,9-tetramethyl-13-oxacyclo(8.3.0.0(4.9))tridecane, 2,3,5,6-tetramethylpyrazine, thyme oil, tomato extract, 2-tridecanone, triethyl citrate, 4-(2,6,6-trimethyl-1-cyclohexenyl)2-buten-4-one, 2,6,6-trimethyl-2-cyclohexene-1,4-dione, 4-(2,6,6-trimethyl-1,3-cyclohexadienyl)2-buten-4-one, 2,3,5-trimethylpyrazine, γ-undecalactone, γ-valerolactone, vanilla extract, vanillin, veratraldehyde, violet leaf absolute, N-ethyl-p-menthane-3-carboxamide (WS-3), and ethyl-2-(p-menthane-3-carboxamide) acetate (WS-5). Menthol is particularly preferred. These flavors may be used alone or in combination of two or more.

[0097] The flavor content of the first tobacco filler is not particularly limited. From the viewpoint of imparting a good smoke taste, the flavor content is typically 10,000 ppm or more, preferably 20,000 ppm or more, more preferably 25,000 ppm or more, and typically 50,000 ppm or less, preferably 40,000 ppm or less, more preferably 33,000 ppm or less.

[0098] The filling density in the first tobacco filler is not particularly limited. From the viewpoints of securing the performance of the non-combustion-heating-type tobacco and imparting a good smoke taste, the filling density is typically 250 mg/cm^3 or more, preferably 320 mg/cm^3 or more, and typically 800 mg/cm^3 or less, preferably 600 mg/cm^3 or less.

[0099] The first tobacco filler described above is wrapped with the wrapping paper so as to be disposed inside, thereby forming the tobacco rod.

[0100] The second tobacco filler is composed of multiple tobacco sheets concentrically arranged. In the present invention, the phrase "concentrically arranged" indicates that all the tobacco sheets are arranged in such a manner that the centers thereof are substantially in the same position. In the present invention, the term "sheet" refers to a shape having a pair of substantially parallel principal surfaces and side surfaces. The second filler is formed by concentrically winding multiple tobacco sheets in a direction orthogonal to the longitudinal direction of the first non-combustion-heating-type tobacco.

[0101] Examples of sheet base materials include tobacco materials such as tobacco powder. In particular, tobacco materials are preferred. A tobacco sheet formed of a tobacco material base sheet loaded with a component that can generate a flavor as required is preferred. The tobacco sheet generates aerosol upon heating. An aerosol source, such as a polyol, e.g., glycerine, propylene glycol, or 1,3-butanediol, is added as an aerosol-source material. The amount of aerosol-source material added is preferably 5% to 50% by weight, more preferably 15% to 25% by weight, based on the dry weight of the tobacco sheet.

[0102] A tobacco sheet as a material before being concentrically arranged will be described.

[0103] The tobacco sheet can be appropriately produced by a known method, such as papermaking, slurrying, or rolling. The homogenized sheet described for the first tobacco filler can also be used.

[0104] In the case of papermaking, the tobacco sheet can be produced by a method including the following steps. 1) Dry tobacco leaves are coarsely ground and extracted with water to separate into a water extract and a residue. 2) The water extract is concentrated by drying under reduced pressure. 3) Pulp is added to the residue, and the mixture is fiberized with a refiner and then formed into a sheet. 4) The concentrate of the water extract is added to the formed sheet, and then drying is performed to provide a tobacco sheet. In this case, a step of removing some components, such as nitrosamines, may be included (see PCT Japanese Translation Patent Publication No. 2004-510422).

[0105] In the case of a slurry method, the tobacco sheet can be produced by a method including the following steps. 1) Water, pulp, and a binder are mixed with ground tobacco leaves. 2) The mixture is spread (cast) and dried. In this case, a step of removing some components, such as nitrosamines, by subjecting the slurry prepared by mixing water, pulp, and a binder with ground tobacco leaves to ultraviolet irradiation or X-ray irradiation may be included.

[0106] Alternatively, as described in International Publication No. 2014/104078, a nonwoven tobacco sheet produced by a method including the following steps may also be used. 1) Powdery and granular tobacco leaves and a binder are mixed together. 2) The mixture is sandwiched between nonwoven fabrics. 3) The stack is formed into a certain shape by heat welding to provide a nonwoven tobacco sheet.

[0107] The type of raw-material tobacco leaves used in the methods described above may be the same as that described for the first filler.

[0108] The composition of the tobacco sheet is not particularly limited. For example, the amount of tobacco raw materials (tobacco leaves) is preferably 50% to 95% by weight based on the total weight of the tobacco sheet. The tobacco sheet may contain a binder. Examples of such a binder include guar gum, xanthan gum, carboxymethyl cellulose (CMC), and CMC-Na (sodium salt of carboxymethyl cellulose). The amount of binder is preferably 1% to 20% by weight based on the total weight of the tobacco sheet. The tobacco sheet may further contain other additives. Examples of the additives include fillers such as pulp. The multiple tobacco sheets are used in the present invention. The multiple tobacco sheets may all have the same composition or physical properties. Some or all of the tobacco sheets may have different compositions or physical properties.

[0109] The second tobacco filler can be produced by providing multiple tobacco sheets having different widths, preparing a stack whose width is reduced from the bottom to the top, and winding the stack by inserting it into a winding tube. According to this production method, the multiple tobacco sheets extend in the longitudinal direction and are concentrically arranged around the longitudinal axis. A fitting portion extending in the longitudinal direction may be formed between the longitudinal axis and the innermost tobacco sheet.

[0110] In this production method, the stack is preferably formed in such a manner that a non-contact portion is formed between adjacent tobacco sheets described above after winding.

[0111] The presence of a non-contact portion (gap), where the tobacco sheets are not in contact with each other, between the multiple tobacco sheets can ensure a flavor flow path and enhance the delivery efficiency of the flavor component. Moreover, heat from the heater can be transferred to outer tobacco sheets through a contact portion between the multiple tobacco sheets, thereby ensuring high heat transfer efficiency.

[0112] To provide the non-contact portion, where the tobacco sheets are not in contact with each other, between the multiple tobacco sheets, the stack can be formed by, for example, using embossed tobacco sheets, performing stacking without bonding together the entire surfaces of adjacent tobacco sheets, performing stacking with adjacent tobacco sheets partially bonded together, or performing stacking with adjacent tobacco sheets entirely or partially bonded together in a light manner such that they are separated after being wound.

[0113] When a tobacco rod including wrapping paper is formed, the wrapping paper may be disposed at the bottom of the stack.

[0114] A fitting portion can also be formed by forming the second tobacco filler with a cylindrical dummy, such as a mandrel, placed on the top of the stack and then removing the dummy.

[0115] The thickness of each of the tobacco sheets is not particularly limited. The thickness is preferably 200 to 600 μm in light of the balance between heat transfer efficiency and strength. The thicknesses of the tobacco sheets may be the same or different.

[0116] The number of tobacco sheets constituting the second tobacco filler is not particularly limited, and may be, for example, two, three, four, five, or six sheets.

[0117] The third tobacco filler is composed of a single folded tobacco sheet. The sheet may be what is called a gathered sheet that has a length comparable to the longitudinal length of the tobacco rod and is loaded as folded multiple times in parallel with the longitudinal direction of the tobacco rod. The thickness of the sheet is preferably 200 to 600 μm in light of the balance between heat transfer efficiency and strength,

[0118] The sheet base material used for the third tobacco filler may be the same as that used for the second tobacco filler.

[Wrapping Paper]

[0119] The configuration of the wrapping paper is not particularly limited, and a typical configuration can be used. For

example, as the base paper used for the wrapping paper, cellulose fiber paper can be used. More specifically, hemp, wood, or a mixture thereof can be used. The term "wrapping paper" used here is used for wrapping the tobacco filler. This wrapping paper is not illustrated in the drawings of the present specification.

[0120] The wrapping paper may contain a filler. The type of filler is not limited. Examples thereof include metal carbonates, such as calcium carbonate and magnesium carbonate, metal oxides, such as titanium oxide and aluminum oxide, metal sulfates, such as barium sulfate and calcium sulfate, metal sulfides, such as zinc sulfide, quartz, kaolin, talc, diatomaceous earth, and gypsum. In particular, calcium carbonate is preferably contained from the viewpoints of improving whiteness and opacity and increasing the heating rate.

[0121] The mixing ratio of the filler in the wrapping paper is not particularly limited, and is typically 1% to 50% by weight, preferably 5% to 45% by weight, more preferably 10% to 42% by weight, particularly preferably 20% to 40% by weight. For example, in the case of determining the calcium carbonate content, the calcium carbonate content can be determined by ash content measurement or by quantifying calcium ions after extraction.

[0122] Below the lower limit of the above range, the wrapping paper is liable to be scorched. Above the upper limit, the strength of the wrapping paper is greatly decreased, and the winding properties may be deteriorated.

[0123] Various assistants other than the base paper or the filler may be added to the wrapping paper. For example, a water resistance improver may be added to improve the water resistance. The water resistance improver includes a wet strength agent (WS agent) and a sizing agent. Examples of the wet strength agent include urea formaldehyde resins, melamine formaldehyde resins, and polyamide epichlorohydrin (PAE). Examples of the sizing agent include rosin soap, alkyl ketene dimers (AKDs), alkenyl succinic anhydrides (ASAs), and highly saponified poly(vinyl alcohol) having a degree of saponification of 90% or more.

[0124] As an assistant, a paper strengthening agent may be added. Examples thereof include polyacrylamide, cationic starch, oxidized starch, CMC, polyamide-epichlorohydrin resins, and poly(vinyl alcohol). In particular, it is known that the use of a very small amount of oxidized starch improves the air permeability (Japanese Unexamined Patent Application Publication No. 2017-218699).

[0125] The wrapping paper may be appropriately coated.

[0126] A coating agent may be added to at least one of the two surfaces of the front surface and the back surface of the wrapping paper. The coating agent is not particularly limited, and is preferably a coating agent capable of forming a film on the surface of the paper to reduce the liquid permeability. Examples thereof include alginic acid and salts thereof (such as a sodium salt), polysaccharides such as pectin, cellulose derivatives, such as ethyl cellulose, methyl cellulose, carboxymethyl cellulose and nitrocellulose, and starch and derivatives thereof (such as ether derivatives, e.g., carboxymethyl starch, hydroxyalkyl starch, and cationic starch, and ester derivatives, such as starch acetate, starch phosphate, and starch octenylsuccinate).

[0127] The basis weight of the wrapping paper is typically 20 to 45 g/m^2, preferably 20 to 45 g/m^2. When the basis weight is within this range, appropriate strength and winding properties can be maintained.

[0128] The air permeability of the wrapping paper is typically 0 to 120 Coresta units, preferably 5 to 100 Coresta units, more preferably 10 to 80 Coresta units. When the air permeability is within this range, appropriate strength and an appropriate smoke taste can be maintained.

<Mouthpiece Portion>

[0129] The configuration of the non-combustion-heating-type tobacco 1 is not particularly limited and can be a typical configuration. For example, as illustrated in Figs. 1 and 2, the mouthpiece portion may be formed of a single member. As illustrated in Fig. 3, the mouthpiece portion may be formed of multiple segments including a cooling portion 14 disposed adjacent to the tobacco rod and a filter portion 15 disposed adjacent to the inhalation port.

[Cooling Portion]

[0130] The configuration of the cooling portion 14 is not particularly limited as long as it has the function of cooling mainstream tobacco smoke. For example, a configuration obtained by processing thick paper into a cylindrical shape can be used. In this case, the inside of the cylindrical shape is a cavity. The vapor containing the aerosol-source material and the tobacco flavor component comes into contact with the air in the cavity and thereby is cooled.

[0131] The non-combustion-heating-type tobacco 1 may have an perforation (not illustrated) for taking in air from the outside in the cooling portion 14 and part of the tipping paper 12 covering the cooling portion 14. The presence of such a perforation enables the flow of air from the outside into the cooling portion 14. The air from the outside comes into contact with vapors containing the aerosol-source material and the tobacco flavor component generated by heating the tobacco rod during use. This results in a decrease in temperature to liquefy the vapors, thereby promoting the formation of the aerosol. When the cooling portion 14 has multiple perforations, the multiple perforations are arranged in the circumferential direction of the outer circumferential surface of the cooling portion 14. The number of perforations arranged

in the circumferential direction is not particularly limited, and may be two or more. The cooling portion 14 may have a cylindrical shape with a cavity, but is not limited to this shape.

[0132] The perforation preferably has a diameter of 100 to 1,000 μm, more preferably 300 to 800 μm. The perforation preferably has a substantially circular shape or a substantially elliptical shape, and the diameter in the case of the substantially elliptical shape represents the major diameter.

[0133] The tipping paper 12 and the resin composition 13 may or need not have a hole with which the perforation in the cooling portion 14 communicates. Preferably, they have a hole from the viewpoint of promoting the cooling effect.

[0134] The perforation is disposed in the circumferential direction of the outer circumferential surface of the cooling portion 14. However, the number of perforations arranged in the circumferential direction (also referred to as "circumferential arrangement") is not particularly limited, and may be two or more.

[0135] In addition, the inside of the cooling portion 14 may be loaded with a gathered sheet-shaped member, such as paper, a polymer film, or metal foil. In this case, the vapors can be cooled by utilizing the specific heat of these members.

[0136] The height of the cooling portion 14 in the longitudinal direction is not particularly limited, but is typically 5 to 40 mm, preferably 10 to 35 mm, more preferably 15 to 30 mm from the viewpoint of ensuring the cooling function.

[Filter Portion]

[0137] The configuration of the filter portion 15 is not particularly limited as long as it has a function as a typical filter. An example thereof is a configuration obtained by processing cellulose acetate tow into a pillar shape. The filament denier and the total denier of the cellulose acetate tow are not particularly limited, but in the case of the filter portion having a circumference of 22 mm, the filament denier is preferably 5 to 12 g/9,000 m, and the total denier is preferably 12,000 to 30,000 g/9,000 m. The cross-sectional shape of the yarn of the cellulose acetate tow may be a Y cross section or an R cross section. In the case of a filter filled with the cellulose acetate tow, triacetin may be added in an amount of 5% to 10% by weight based on the weight of the cellulose acetate tow in order to improve the hardness of the filter.

[0138] The filter portion 15 is composed of a single segment in Fig. 3, but may be composed of multiple segments. When it is composed of multiple segments, for example, an embodiment can be mentioned in which a hollow segment such as a center hole is disposed on an upstream side (tobacco rod side), and an acetate filter in which the cross section of an inhalation port is filled with the cellulose acetate tow is disposed as a segment on a downstream side (inhalation port end side of the user). According to such an embodiment, it is possible to prevent unnecessary loss of the generated aerosol and to improve the appearance of the non-combustion-heating-type tobacco. From the viewpoints of a change in the sensation of sucking and a feeling of holding, an embodiment may be mentioned in which the acetate filter is disposed on the upstream side and the hollow segment, such as a center hole, is disposed on the downstream side. An embodiment may also be mentioned in which a paper filter filled with sheet-like pulp paper is used instead of the acetate filter.

[0139] In the production of the filter, adjustment of ventilation resistance and addition of additives (e.g., known adsorbents, flavors, and flavor holding materials) can be appropriately designed.

<Electrically Heated Tobacco Product>

[0140] An electrically heated tobacco product according to an embodiment includes an electric heating device and the non-combustion-heating-type tobacco described above, the electric heating device including a heater member, a battery unit that serves as a power source for the heater member, and a control unit for controlling the heater member, and the non-combustion-heating-type tobacco being to be inserted into the electric heating device in such a manner that the non-combustion-heating-type tobacco comes into contact with the heater member.

[0141] As an embodiment of the electrically heated tobacco product, an embodiment may be mentioned in which the outer circumferential surface of the non-combustion-heating-type tobacco is heated as illustrated in Fig. 4. Alternatively, an embodiment may also be mentioned in which the tobacco rod portion of the non-combustion-heating-type tobacco is heated from the inside thereof as illustrated in Fig. 5. Although the electric heating device 2 illustrated in each of Figs. 4 and 5 is provided with an air intake hole, the air intake hole is not illustrated here. The electrically heated tobacco product will be described below with reference to Fig. 4.

[0142] When the electrically heated tobacco product 3 is used, the above-described non-combustion-heating-type tobacco 1 is inserted so as to come into contact with the heater member 23 disposed inside the electric heating device 2.

[0143] The electric heating device 2 includes a battery unit 20 and a control unit 21 inside a body 22 composed of, for example, a resin.

[0144] When the non-combustion-heating-type tobacco 1 is inserted into the electric heating device 2, the outer circumferential surface of the tobacco rod portion comes into contact with the heater member 23 of the electric heating device 2, and then the whole outer circumferential surface of the tobacco rod portion and part of the outer circumferential surface of the wrapped portion come into contact with the heater member.

[0145] The heater member 23 of the electric heating device 2 produces heat under the control of the control unit 20. When the heat is transferred to the tobacco rod portion of the non-combustion-heating-type tobacco, the aerosol-source material, the flavor component, and the like contained in the tobacco filler of the tobacco rod portion are volatilized.

[0146] The heater member may be, for example, a sheet-like heater, a flat plate-like heater, or a cylindrical heater. The sheet-like heater is a flexible sheet-shaped heater. An example thereof is a heater including a film (having a thickness of about 20 to about 225 μm) composed of a heat-resistant polymer such as polyimide. The flat plate-like heater is a rigid flat-plate-shaped heater (having a thickness of about 200 to about 500 μm). An example thereof is a heater including a resistance circuit on a flat substrate, the resistance circuit serving as a heat-producing portion. The cylindrical heater is a hollow or solid cylindrical heater (having a thickness of about 200 to about 500 μm). An example thereof is a heater including a resistance circuit on an outer circumferential surface of a cylinder composed of a metal or the like, the resistance circuit serving as a heat-producing portion. In addition, a pillar-shaped heater and a conical heater composed of a metal and so forth are also exemplified, in which each of the heaters includes a resistance circuit therein, and the resistance circuit serves as a heat-producing portion. The cross-sectional shape of the cylindrical heater may be, for example, a circle, an ellipse, a polygon, or a rounded polygon.

[0147] In the case of an embodiment in which the outer circumferential surface of the non-combustion-heating-type tobacco is heated as illustrated in Fig. 4, the sheet-like heater, the flat plate-like heater, and the cylindrical heater can be used. In the case of an embodiment in which heating is performed from the inside of the tobacco rod portion of the non-combustion-heating-type tobacco as illustrated in Fig. 5, the flat plate-like heater, the pillar-shaped heater, and the conical heater can be used.

[0148] The length of the heater member in the longitudinal direction can be in the range of L ± 5.0 mm, where L mm is the length of the tobacco rod portion in the longitudinal direction. The length of the heater member in the longitudinal direction is preferably L mm or more from the viewpoints of sufficiently transferring heat to the tobacco rod portion and sufficiently volatilizing the aerosol-source material, the flavor component, and the like contained in the tobacco filler, that is, aerosol delivery. The length is preferably L + 0.5 mm or less, L + 1.0 mm or less, L + 1.5 mm or less, L + 2.0 mm or less, L + 2.5 mm or less, L + 3.0 mm or less, L + 3.5 mm or less, L + 4.0 mm or less, L + 4.5 mm or less, or L + 5.0 mm or less, from the viewpoint of suppressing generation of components having an undesirable influence on the smoke taste and the like.

[0149] Heating intensity such as heating time and heating temperature of the non-combustion-heating-type tobacco by the heater member can be set in advance for each electrically heated tobacco product. For example, the temperature can be set in advance as follows: after the non-combustion-heating-type tobacco is inserted into the electric heating device, preheating is performed for a certain period of time until the temperature of the outer circumferential surface of a predetermined position of the portion of the non-combustion-heating-type tobacco inserted into the device reaches X (°C), and then the temperature is maintained at a certain temperature equal to or lower than X (°C).

[0150] X (°C) is preferably 80°C or higher and 400°C or lower in light of the amount of aerosol delivered. Specifically, X can be 80°C, 90°C, 100°C, 110°C, 120°C, 130°C, 140°C, 150°C, 160°C, 170°C, 180°C, 190°C, 200°C, 210°C, 220°C, 230°C, 240°C, 250°C, 260°C, 270°C, 280°C, 290°C, 300°C, 310°C, 320°C, 330°C, 340°C, 350°C, 360°C, 370°C, 380°C, 390°C, or 400°C.

[0151] Usually, the temperature of the portion heated by the heater member in the region coated with the resin composition in the tipping paper included in the wrapped portion is not higher than 230°C during use. The heating temperature during use of the portion may be 200°C or higher and lower than 230°C, 180°C or higher and lower than 200°C, or 160°C or higher and lower than 180°C. In the case of using a conventional coating agent containing nitrocellulose, heating a region coated therewith to a temperature higher than 200°C may form TSNA described above.

[0152] The temperature of the outer circumferential surface of the predetermined position in the non-combustion-heating-type tobacco when the non-combustion-heating-type tobacco is heated by the electric heating device is measured by a method described below.

[0153] By heating with the heater member, vapors containing the aerosol-source material, the flavor components, and the like are generated from the tobacco rod portion. The vapors reach the oral cavity of the user through the mouthpiece portion including the cooling portion, the filter portion, and the like.

<Method for Measuring Temperature of Outer Circumferential Surface of non-combustion-heating-type Tobacco>

[0154] The temperature of the outer circumferential surface of the non-combustion-heating-type tobacco when the non-combustion-heating-type tobacco is heated by the electric heating device is measured by the following method.

[0155] A thermocouple (model number TI-SP-K, available from Toa Electric Inc.) is attached to the outer circumferential surface of the wrapped portion of the non-combustion-heating-type tobacco in such a manner that the temperature at a predetermined position can be measured when the non-combustion-heating-type tobacco is used. For attaching the thermocouple, a polyimide tape (thickness: 50 μm) is cut and used.

[0156] The non-combustion-heating-type tobacco to which the thermocouple has been attached is inserted into the

electric heating device. Then the maximum temperature at each measurement point under the heater temperature in <Smoking Test> described above is recorded and defined as the temperature of the outer circumferential surface of the non-combustion-heating-type tobacco at a predetermined position.

<Smoking Test>

[0157] The smoking test is performed under the following conditions with reference to Canadian Intense Smoking (CIR).

[0158] For example, the electrically heated tobacco product described above is used. The tobacco rod portion of the non-combustion-heating-type tobacco is inserted. Thereafter, the heater temperature is increased to 230°C within 17 seconds, maintained at this temperature for 23 seconds, and then kept constant in a temperature range of 170°C to 175°C. After that, in the smoking test, automatic smoking is performed with a single-port automatic smoking machine, available from Borgwaldt KC at a flow rate of 55 cc/2 seconds and smoking intervals of 30 seconds. At this time, the smoking test is performed without closing the external air intake hole provided in the outer circumference of the cooling portion. Mainstream smoke generated in the smoking test is collected in a Cambridge pad. The Cambridge pad is taken out after performing a puff action 10 times.

<Method for Measuring Amount of TSNA>

[0159] The method for measuring the amount of TSNA in the non-combustion-heating-type tobacco is not particularly limited. The measurement can be performed as follows: For example, a measurement target is added to a 0.1 M (mol/L) aqueous ammonium acetate solution. Stirring extraction (180 rpm, 60 minutes) is performed. Filtration is then performed with a glass fiber filter. The resulting filtrate is subjected to ion chromatography. As the mobile phase, an aqueous solution of acetic acid and a methanol solution of acetic acid can be used.

EXAMPLES

[0160] The present invention will be described more specifically with reference to Examples, but the present invention is not limited by the description of the following Examples without departing from the gist thereof.

<Examples and Comparative Examples>

[Preparation of Tipping Paper for Forming Wrapped Portion]

[0161] Resin compositions having compositions given in Table 1 were prepared. Each resin composition was prepared by dissolving a solid component in a solvent (ethyl acetate) in such a manner that the solid weight was 14% to 15% by weight. Tipping paper (basis weight: 37 g/mm^2, thickness: 40 μm), available from Nippon Paper Papylia Co., Ltd., was used as the tipping paper. The size of the prepared tipping paper was such that the wrap circumference was 22 mm and the wrap length was 40 mm.

[0162] Except for Reference example 1, each resin composition was applied to the tipping paper with a micropipette tip for 20 μl. At this time, the resin composition was uniformly applied in such a manner that the weight of the solid content originating from the resin composition on the tipping paper was 0.21% by weight. In Reference example 1, the above-described base paper for the tipping paper was used as it was.

[Production of Tobacco Rod Portion]

[0163] Shredded sheet tobacco mixed with a flavor in a proportion of 2 g/100 g and an aerosol-source material (glycerine) in a proportion of 40/100 g was prepared as a tobacco filler. The tobacco filler was wrapped with wrapping paper (basis weight: 35 g/m^2, thickness: 52 μm, available from Nippon Paper Papylia Co., Ltd.) using a high-speed wrapping machine.

[0164] The weight of the shredded tobacco was 0.8 g per piece, the wrap circumference was 22 mm, and the wrap length was 68 mm.

[0165] The wrapped tobacco rods were placed into sealed plastic containers and stored in groups of 200 pieces for each level.

[Production of Non-combustion-heating-type Tobacco]

[0166] The tobacco rod portion produced by the above-described method was cut to a length 20 mm. Thereafter, the tobacco rod portion, a cooling portion in which a dilution air hole was provided on the outer circumference of a cardboard

tube having a length of 20 mm, a support portion composed of a center-hole filter having a through-hole with a length of 8 mm, and a filter portion filled with cellulose acetate fibers having a length of 7 mm were manually wrapped with the tipping paper prepared above to form a wrapped portion, thereby producing non-combustion-heating-type tobaccos of Examples and Comparative examples.

<Smoking Test>

[0167] Each of the non-combustion-heating-type tobaccos produced in Examples and Comparative examples was subjected to a smoking test. As the electrically heated tobacco product subjected to the smoking test, a product having the above-described configuration was used. The tobacco rod portion of the non-combustion-heating-type tobacco was inserted. Thereafter, the heater temperature was increased to 230°C within 17 seconds, maintained at this temperature for 23 seconds, and then kept constant in a temperature range of 170°C to 175°C. After that, in the smoking test, automatic smoking was performed with a single-port automatic smoking machine, available from Borgwaldt KC at a flow rate of 55 cc/2 seconds and smoking intervals of 30 seconds. At this time, the smoking test was performed without closing the external air intake hole provided in the outer circumference of the cooling portion. Mainstream smoke generated in the smoking test was collected in a Cambridge pad. The Cambridge pad was taken out after performing a puff action 10 times.

<Measurement of TSNA>

[0168] The amount of TSNA contained in the non-combustion-heating-type tobacco after the smoking test was measured by the following method.

[0169] Stirring extraction (180 rpm, 60 minutes) was performed using the Cambridge pad that had been taken out. The extract was then filtered with a glass fiber filter. The resulting filtrate was subjected to ion chromatography to measure the amount of TSNA. As the mobile phase, an aqueous solution of acetic acid and a methanol solution of acetic acid were used. Table 1 presents the TSNA content of each measurement target measured using the non-combustion-heating-type tobaccos of Examples and Comparative examples.

<Evaluation of Curl Property of Tipping Paper>

[0170] Each resin composition given in Table 1, adjusted to a viscosity of 15 seconds/ZC#3 with a solvent, was applied to the base paper for the tipping paper with a coater (corresponding to a cell depth of 30 μm) and dried with a dryer to prepare a sample.

[0171] The base paper was cut to a width of 6 cm. After the base paper was allowed to stand at room temperature for 24 hours, the state of concave curl of the sample (floating at both ends of the 6-cm-wide base paper) was evaluated. The evaluation was performed at five points, and the average was calculated (unit: mm). Table 1 presents the results.

[Table 1]

	Resin composition applied	Carl property	TSNA measurement result (ng/piece)				
			NNN	NAT	NAB	NNK	Total
Reference example 1	-	-	15.2	30.7	3.6	6.3	55.9
Comparative example 1	nitrocellulose	3.50	18.3	35.5	4.5	6.4	64.7
Comparative example 2	nitrocellulose: plasticizer (8:2 ratio by weight)	3.25	27.7	47.1	5.8	7.6	88.1
Comparative example 3	ethyl cellulose	3.00	15.3	30.5	3.7	6.2	55.6
Example 1	ethyl cellulose: plasticizer (8:2 ratio by weight)	1.50	15.3	30.8	3.7	6.2	56.0

* NNN: N'-nitrosonornicotine, NAT: N'-nitrosoanatabine, NAB: N'-nitrosoanabasine, NNK: 4-(N-nitrosomethylamino)-1-(3 -pyridyl)-1-butanone
** Plasaticizer: triacetin

[0172] In Table 1, a comparison of the cases where ethyl cellulose was added to the resin compositions (Comparative example 3 and Example 1) and the cases where nitrocellulose was added to the resin compositions (Comparative examples 1 and 2) revealed that the amount of TSNA formed was obviously larger when nitrocellulose was added.

[0173] The results given in Table 1 also revealed that in the case where the resin composition contained nitrocellulose, there was no large difference between the case where the resin composition contained nitrocellulose alone (Comparative example 1) and the case where the resin composition contained the plasticizer in combination (Comparative example 2), and no effect due to the addition of the plasticizer was observed. In the case where the resin composition contained ethyl cellulose, the numerical value of the curl property was reduced by half in Example 1, compared with the case where the resin composition contained ethyl cellulose alone (Comparative example 3) and the case where the resin composition contained the plasticizer in combination (Example 1), and a remarkable effect due to the addition of the plasticizer was observed.

[0174] To study the effect of adding a pigment or a thermal developer as an optional component to the resin composition, the following test was conducted.

(Example 4)

[0175] A resin composition containing a pigment (aluminum (available from Tokyo Printing Ink Mfg. Co., Ltd.)) in a ratio by weight of pigment: ethyl cellulose = 2:1 was prepared in the same manner as in Examples and the like, and tipping paper was produced in the same procedure as in Examples. A tobacco rod portion was produced using the produced tipping paper in the same manner as in Examples, and a non-combustion-heating-type tobacco was produced.

(Comparative Example 4)

[0176] A resin composition containing a pigment (aluminum (available from Tokyo Printing Ink Mfg. Co., Ltd.)) in a ratio by weight of pigment: nitrocellulose = 2:1 was prepared in the same manner as in Examples and the like, and tipping paper was produced in the same procedure as in Examples. A tobacco rod portion was produced using the produced tipping paper in the same manner as in Examples, and a non-combustion-heating-type tobacco was produced.

(Example 5)

[0177] A resin composition containing a thermal developer (tripotassium citrate monohydrate (available from Fuso Chemical Co., Ltd.)) in a ratio by weight of tripotassium citrate monohydrate: ethyl cellulose = 4:3 was prepared in the same manner as in Examples and the like, and tipping paper was produced in the same procedure as in Examples. A tobacco rod portion was produced using the produced tipping paper in the same manner as in Examples, and a non-combustion-heating-type tobacco was produced.

(Comparative Example 5)

[0178] A resin composition containing a thermal developer (tripotassium citrate monohydrate (available from Fuso Chemical Co., Ltd.)) in a ratio by weight of tripotassium citrate monohydrate:nitrocellulose = 4:3 was prepared in the same manner as in Examples and the like, and tipping paper was produced in the same procedure as in Examples. A tobacco rod portion was produced using the produced tipping paper in the same manner as in Examples, and a non-combustion-heating-type tobacco was produced.

[0179] Using the sheets of the tipping paper and the non-combustion-heating-type tobaccos produced above, the smoking test, the TSNA measurement, and the evaluation of the curl property were performed in the same manner as in Examples and the like. Table 2 presents the results.

[Table 2]

	Resin composition applied	Carl property	TSNA measurement result (ng/piece)				
			NNN	NAT	NAB	NNK	Total
Example 4	ethyl cellulose, plasticizer, pigment ratio by weight of resin component: ethyl cellulose: plasticizer = 8:2 ethyl cellulose: pigment = 1:2	1.50	14.2	24.9	3.4	5.8	48.3

(continued)

	Resin composition applied	Carl property	TSNA measurement result (ng/piece)				
			NNN	NAT	NAB	NNK	Total
Comparative example 4	nitrocellulose, plasticizer, pigment ratio by weight of resin component: nitrocellulose: plasticizer = 8:2 nitrocellulose:pigment = 1:2	2.13	46.0	61.7	8.7	8.1	124.5
Example 5	ethyl cellulose, plasticizer, thermal developer ratio by weight of resin component: ethyl cellulose: plasticizer = 8:2 ethyl cellulose: thermal developer = 3:4	1.15	14.7	25.8	3.2	5.9	49.6
Comparative example 5	nitrocellulose, plasticizer, thermal developer ratio by weight of resin component: nitrocellulose: plasticizer = 8:2 nitrocellulose: thermal developer = 3:4	2.30	26.4	52.8	6.6	7.5	93.3

[0180] The results given in Table 2 revealed that even when the pigment or the thermal developer was added as an optional component to the resin composition, when the predetermined resin of the present invention was used, the effect of suppressing the formation of TSNA was provided, and the curl property was improved when the resin was used in combination with the plasticizer. In Comparative examples in which nitrocellulose was used as the resin, such an effect was not provided.

Reference Signs List

[0181]

1 non-combustion-heating-type tobacco
10 tobacco rod portion
11 mouthpiece portion
12 tipping paper
13 resin composition
14 cooling portion
15 filter portion
2 electric heating device
20 battery unit
21 control unit
22 body
23 heater member
3 electrically heated tobacco product

Claims

1. A non-combustion-heating-type tobacco, comprising a tobacco rod portion, a mouthpiece portion, and a wrapped portion in which the tobacco rod portion and the mouthpiece portion are wrapped with tipping paper,

wherein at least part of the tipping paper included in the wrapped portion is coated with a resin composition,
a region coated with the resin composition includes a heating area when the non-combustion-heating-type tobacco is used, and
the resin composition contains one or more resins selected from the group consisting of ethyl cellulose, hydrox-

yethyl cellulose, methyl cellulose, hydroxyethylmethyl cellulose, carboxymethyl cellulose, alkyd resins, polyamide resins, styrene-acrylic resins, butyl methacrylate-methyl methacrylate resins, and polyester resins, and a plasticizer.

2. The non-combustion-heating-type tobacco according to claim 1, wherein the region coated with the resin composition includes at least a region having a length of 10% or less of an entire length of the tipping paper in a longitudinal direction of the non-combustion-heating-type tobacco and extending from an end portion of the tipping paper adjacent to the tobacco rod toward an end portion of an inhalation port.

3. The non-combustion-heating-type tobacco according to claim 1 or 2, wherein the region coated with the resin composition includes at least a region extending from an end portion of the wrapped portion adjacent to the tobacco rod in a longitudinal direction to a position 5 mm or less from the end portion.

4. The non-combustion-heating-type tobacco according to any one of claims 1 to 3, wherein the resin composition further contains a coloring component.

5. The non-combustion-heating-type tobacco according to any one of claims 1 to 4, wherein the resin composition further contains a thermal developer.

6. The non-combustion-heating-type tobacco according to any one of claims 1 to 5, wherein a coating amount of solid content originating from the resin composition on the tipping paper is 0.0001% to 3% by weight.

7. The non-combustion-heating-type tobacco according to any one of claims 1 to 6, wherein the mouthpiece portion includes a cooling portion and a filter portion.

8. An electrically heated tobacco product, comprising an electric heating device and the non-combustion-heating-type tobacco according to any one of claims 1 to 7, the electric heating device including a heater member, a battery unit that serves as a power source for the heater member, and a control unit for controlling the heater member, and the non-combustion-heating-type tobacco being to be inserted into the electric heating device in such a manner that the non-combustion-heating-type tobacco comes into contact with the heater member.

FIG. 1

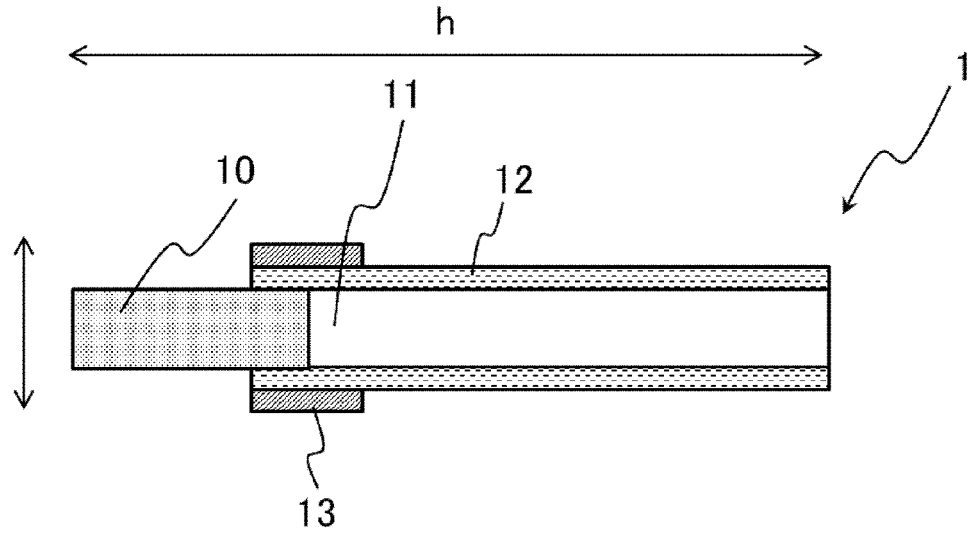


FIG. 2

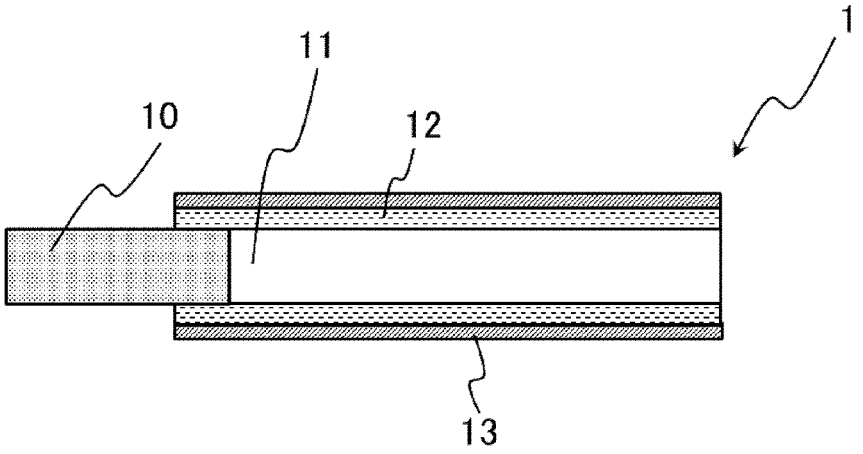


FIG. 3

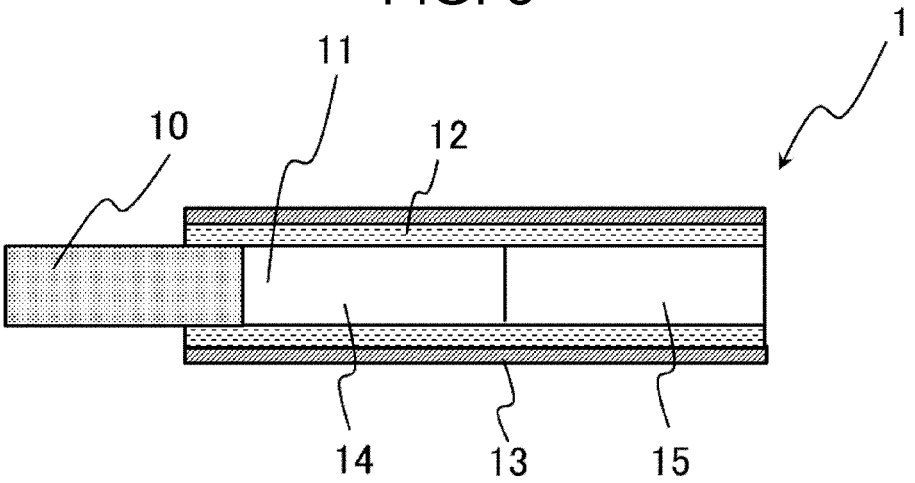


FIG. 4

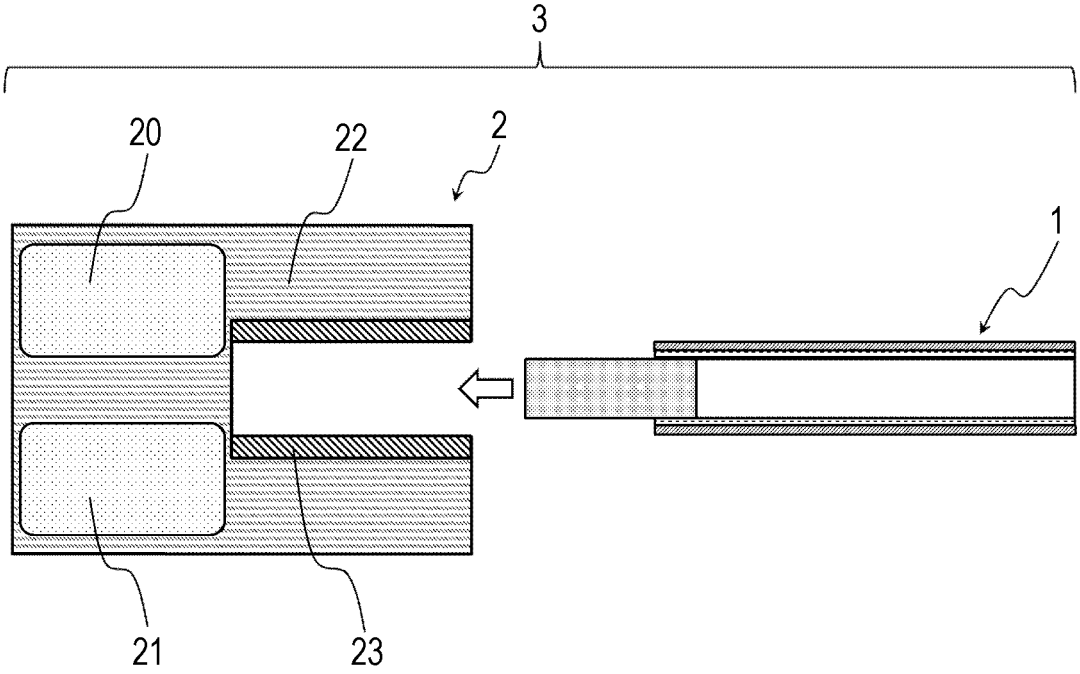
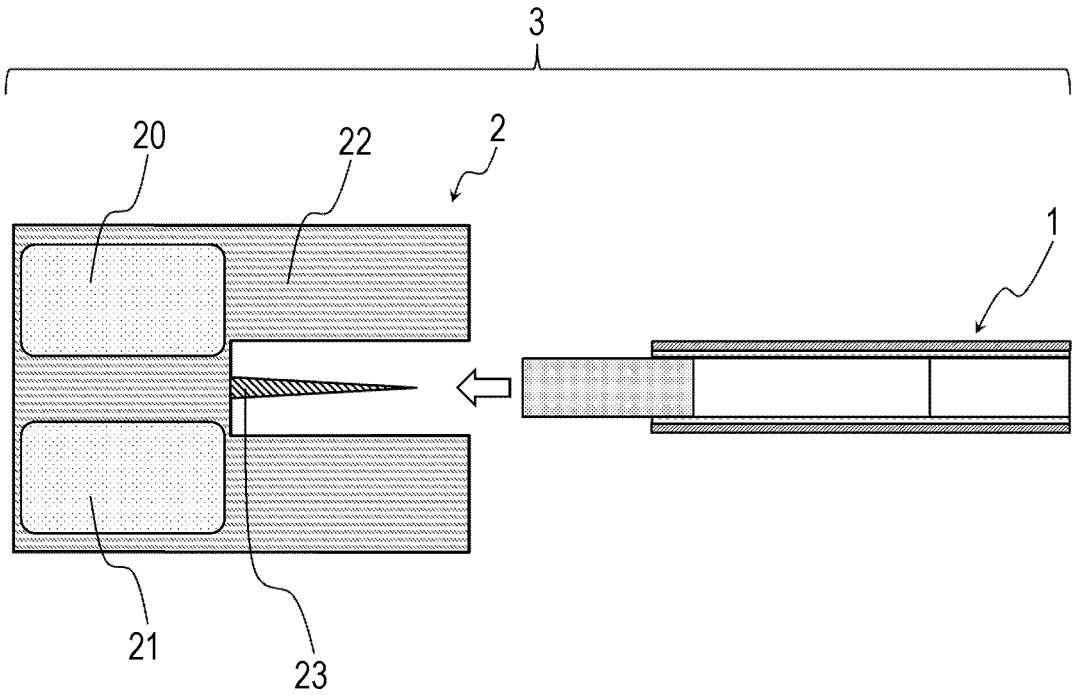


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/030961

A. CLASSIFICATION OF SUBJECT MATTER

A24D 1/20(2020.01)i; ***A24D 3/17***(2020.01)i; ***A24F 40/20***(2020.01)i
FI: A24D1/20; A24D3/17; A24F40/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24D1/20; A24D3/17; A24F40/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2021
Registered utility model specifications of Japan 1996-2021
Published registered utility model applications of Japan 1994-2021

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2019/130446 A1 (JAPAN TOBACCO INC.) 04 July 2019 (2019-07-04) paragraphs [0009], [0042]-[0044], fig. 3	1-3, 6-8
A		4-5
Y	JP 46-40199 B1 (PHILIP MORRIS INC.) 27 November 1971 (1971-11-27) column 6, lines 7-13	1-3, 6-8
Y	JP 49-5931 B1 (HORII TOUSHADOU KK) 09 February 1974 (1974-02-09) column 1, lines 20-27	1-3, 6-8
Y	JP 2013-536697 A (R. J. REYNOLDS TOBACCO COMPANY) 26 September 2013 (2013-09-26) paragraphs [0063], [0064]	1-3, 6-8
Y	JP 2-270589 A (XEROX CORP.) 05 November 1990 (1990-11-05) page 4, lower left column, line 11 to lower right column, line 7	1-3, 6-8
Y	JP 2019-523639 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LTD.) 29 August 2019 (2019-08-29) paragraphs [0011], [0012], [0042]-[0047], fig. 1, 2, 5-7	7-8

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 October 2021	**19 October 2021**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/030961

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2014-0013307 A (KT & G CORPORATION) 05 February 2014 (2014-02-05) paragraph [0031]	4
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